

Implementing pathways to anesthesiology: Promoting diversity, equity, inclusion, and success

Katie J. O'Connor, MD^a, Lisa Young, BS, BA^b, Oluwakemi Tomobi, MD, MEHP^c, Sherita Hill Golden, MD, MHS^d, Christelle D.K. Samen, MD^e, Michael C. Banks, MD, MEHP^f

Inequities in health are increasingly recognized across the country and globe.^{1,2} These inequities in morbidity and mortality stratify on demographic attributes, including race, ethnicity, gender identity, sexual orientation, ability, language status, and other factors individually and intersectionally.^{3–7} Anesthesiologists witness these health inequities across a broad range of practice areas and health care services.^{8–11} The root causes of healthcare inequities are multifactorial and operate at systemic and individual levels. At the systemic or structural level, biases built into policies, procedures, and practices influence the equity of healthcare delivery. These structural biases are often rooted in historical and sociopolitical discrimination, via varied mechanisms including differential access to healthcare;^{12,13} discriminatory policies and practices;^{9,14,15} and biased clinical reference standards.^{16–20} Implicit bias, in contrast, occurs at the individual level while also collectively influencing outcomes. Implicit bias may be linked to differential response to patient concerns, including time to evaluation,^{21,22} degree of diagnostic workup,^{21–24} clinical communication,²⁵ access to referral,²⁶ and/or access to treatment options,²⁷ all ultimately influencing care outcomes.

A diverse workforce is a necessary component in mitigating bias and inequity. The distribution of race, gender, and other demographics in the current healthcare workforce does not correspond to the overall patient population distribution.^{28–30} In academic anesthesiology, only 3% of the anesthesiologist workforce comprises Black or African-American physicians (versus 13% of the general population), and only 6% are from all races underrepresented in medicine (versus 34% of the general population).^{31–33} Women constitute 35% of academic anesthesiology faculty (compared to 50% of the general population).³⁴ From 2009 to 2019, the number of ACGME-accredited pain fellowship programs increased by 14%; however, data reveals

persistent gender and race disparities in the demographics of pain fellows.^{35,36}

The root causes for workforce inequities mirror the causes of health inequities: structural and individual bias and micro-aggressions in the secondary and medical education pathways,³⁷ as well as remnants of more explicit discriminatory policies and practices, such as sociopolitical segregation, educational segregation, and the residual impact of reports and legislation, e.g. the Flexner Report, which led to widespread closure of historically Black medical schools and strained the pathways for individuals of color to enter physician careers, with lasting impact.^{38–41}

Not only is there *prima facie* value in a diverse, inclusive, and equitable workforce, there are also many reasons why workforce diversity positively influences healthcare outcomes, and conversely why lack of diversity contributes to healthcare outcomes disparities.³³ Countless evidence-supported correlations have been identified regarding the benefits of workforce diversity on physician development and patient experience and outcomes. For physicians, some of these benefits include increased productivity and innovation,⁴² improved cognitive and affective development,^{43,44} and expanded breadth and depth of educational and research agendas.^{33,45} For patients, these benefits include improved clinician-patient communication,^{46–48} improved patient satisfaction and knowledge,^{49–53} increased academic focus on addressing disparities,^{33,45,54} improved access,^{50–52,55} and better quality of care and outcomes.^{46–48,55–61}

The leak

Even the apparent recent increases in healthcare workforce diversity obscure the magnitude of the current workforce disparity problem. While there have been modest increases in diversity in the healthcare workforce in aggregate, the proportion of individuals from backgrounds underrepresented in medicine (“URiM”) consistently decreases at each level of advancement in medicine.^{31,62–66} In 2021, 1% of matriculants to United States medical schools identified as Native American or Alaskan Native, 11% identified as Black or African American, and 13% identified as Hispanic, Latine, or of Spanish origin.⁶⁷ Women represented 55% of matriculants.⁶⁷ In contrast, among 2021 anesthesiology residents, 0.1% identified as Native American or Alaskan Native, 5% identified as Black or African American, and 5% identified as Hispanic, Latine, or of Spanish origin. Only 33% identified as female and only one student identified as gender non-binary.⁶⁸ A change in the proportions of race and gender representation from one level to the next reflects inequity, highlighting the “leak,” so to speak. This gap further stratifies at the faculty level, where most URiM physicians in academic medicine, including anesthesiology, are at the instructor or assistant professor rank,

^aFaculty, Chief Diversity & Equity Officer, Department of Anesthesiology and Critical Care Medicine, Johns Hopkins University School of Medicine, ^bJohns Hopkins University School of Medicine, ^cGlobal Alliance of Perioperative Professionals, Department of Anesthesiology and Critical Care Medicine, Johns Hopkins University School of Medicine, ^dHugh P. McCormick Family Professor of Endocrinology and Metabolism, Vice President, Chief Diversity Officer, Office of Diversity, Inclusion, and Health Equity, Johns Hopkins Medicine, ^eClinical Fellow, Department of Anesthesiology and Critical Care Medicine, Johns Hopkins University School of Medicine and ^fAssistant Professor, Vice Chair for Diversity, Equity, and Inclusion, Assistant Residency Director, Department of Anesthesiology and Critical Care Medicine, Johns Hopkins University School of Medicine; Adjunct Faculty, Johns Hopkins School of Education

ADDRESS CORRESPONDENCE TO: Katie J. O'Connor, MD, Department of Anesthesiology and Critical Care Medicine, Bloomberg 6302, 1800 Orleans St, Baltimore MD 21287. E-mail: kjo@jhmi.edu

Volume 61, Number 1, 34–41, DOI: 10.1097/AIA.0000000000000386

Copyright © 2022 Wolters Kluwer Health, Inc. All rights reserved.

and are underrepresented at higher ranks, including associate professor, professor, chair, associate dean, or dean.^{31,66,69–71}

As stated previously, the driving factors for workforce and advancement inequities are historical injustices as well as ongoing systemic barriers to the success of URiM individuals, which may be modifiable or mitigated. These challenges include implicit biases in the advancement process,^{31,72–74} micro- and macroaggressions,^{37,75–77} deficiency of optimal mentors,^{31,78,79} disparate access and information regarding opportunities for advancement,^{74,79} disparate expectations (e.g., the “minority tax,” the “glass ceiling,” and the “glass cliff”),^{45,74,80–82} and other insidious factors.

Herein, we will describe strategies for improving diversity and equitable representation in the anesthesiologist workforce, specifically by improving pathways and environments to enter and advance in anesthesiology. Although each individual whose identity includes one or more URiM demographic categories (e.g., race, gender identity, sexual orientation, et al) faces unique challenges, we will collectively explore common challenges and themes for any URiM individuals or groups. We will also describe examples from our experience implementing a strategic plan for this mission. Strategies range from readily accessible options for individuals committed to this cause, up to complex, resource-intensive program-building initiatives.

Programmatic interventions

Departmental, divisional, and training program leaders have numerous opportunities and imperatives to promote diversity, equity, and inclusion (DEI) in our field, particularly through focused recruitment and retention (fulfillment and advancement). Recruitment in this context means both the recruitment of anesthesia-bound URiM individuals to a particular institution and the recruitment of URiM individuals to pursue a career in duplicate the specialty of anesthesiology. “Retention” in this context goes beyond simply retaining individuals to stay in this field or at the institution; ensuring their development, fulfillment, advancement, and thriving is also crucial. Furthermore, this yields self-sustaining benefits, as a diverse, equitable, inclusive environment is one of the strongest tools for recruiting and retaining URiM individuals in an institution, department, or program. Advancement of any or all of the recommendations outlined throughout this work contributes to recruitment and retention, enhancing the more explicit guidelines mentioned below.^{29,83,84}

Recruitment

Equitable recruitment entails an equitable approach to all aspects of workforce recruitment – for all roles. In this section, we will discuss recommendations for the recruitment framework for any role, though many examples are most salient for the physician workforce. In graduate medical education, the recruitment process begins long before the application cycle, and we will discuss those seminal elements subsequently in the Pathways section. These recommendations include prioritizing outreach to URiM candidates, addressing systemic and implicit bias challenges at all stages of the recruitment process, diversifying the recruitment leadership, and fostering a data responsive environment.

URiM-focused recruitment outreach

Demonstrate valuing of URiM candidates through directed outreach – at Historically Black Colleges and Universities, through URiM-focused national societies and their conferences (e.g., Student National Medical Association, National Hispanic Medical Association, American Medical Women’s Association, Medical Student Pride Alliance, Association of Native American Medical Students, National First Generation to Medicine Association (FGLIMed)), and via formal or informal networks and affinity groups. For faculty, consider engaging in cohort or cluster recruitment – recruitment of faculty in cohorts can promote a collective morale, with benefits in productivity, retention, and thriving.⁸⁵

URiM-curated recruitment experiences

Provide curated opportunities for URiM candidates to gain experience, exposure, and insights on the program, department, or institution. Dedicating rotation spots or scholarships for visiting electives in anesthesiology may be particularly valuable for individuals at medical schools not offering anesthesiology rotations for medical students and also for individuals with financial constraints. Faculty or resident ambassadors – who represent the program or institution and offer another insight into the institutional DEI culture – may be crucial in connecting URiM candidates with potential opportunities. URiM recruitment and “Second Look” events provide candid settings to learn about the environment, strengths, and challenges at the program or institution. However, these events should be designed with equitable access in mind and not create further disparity due to financial or other burdens. Publicizing DEI policies and mission statements explicitly may be helpful for prospective and current trainees, faculty, and staff because it implies institutional commitment and promotes culture and psychological safety. In order to hold weight, these stated policies must be matched by actual practice.

Equitable and holistic candidate selection practices

Approach candidate selection for interviews and candidate scoring and ranking equitably and holistically. In clerkships, disparities in clerkship grades and Medical Student Performance Evaluation summary words were found to favor white students over URiM or non-URiM minority students.⁸⁶ One study found that most fourth-year medical student participants recalled being asked at least one potentially discriminatory interview question about their marital status, children, pregnancy plans, place of birth or national origin, religion, or ethnicity.⁸⁷ Another study of resident selection found that Asian applicants had their personality less often discussed.⁸⁸ Strategies to mitigate bias in the interview process might be including life-performance questions (e.g., leadership, community service, overcoming adversity, realistic self-appraisal, ability to recognize and navigate one’s own bias, and ability to set goals and self-responsibility) and consistently asking the same questions to all participants.⁸⁹ Addressing biased evaluation approaches and implementing alternative criteria may improve fairness and equity in assessment of candidate qualifications, and increase trainee diversity.⁹⁰

Anti-bias training and awareness

Everyone involved in the candidate recruitment and selection process must understand the value of the perspectives that URiM

candidates bring to patient care and health equity, and the risks of those candidates being undervalued due to bias in the selection process. Not only have URiM candidates likely experienced systemic bias upstream that may influence their candidacy, they are also at risk of experiencing implicit bias during the application process. URiM candidates are at a higher risk of being subjected to interviewer bias, conscious or unconscious.^{83,91} Even the demographics conveyed (or presumed) in their written application can influence how their candidacy is perceived during interviewee selection and the eventual evaluation and ranking process. For example, a Harvard Business School research trial demonstrated that applications that had been “whitened” (i.e. revised by the researchers to exclude race-revealing data) were more than twice as likely to receive interview invitations than the same applications which preserved the data indicating that the applicant was Black or African-American.⁹² Implement specialized anti-bias training for those involved in the recruitment, interviewing, evaluation, and selection processes, in addition to the general anti-bias and cultural humility education that should exist at any institution.⁹³ These training sessions should ideally be interactive, practical, expert-led, and tailored for the specific context or practice; simple click-through, self-study modules are not enough.⁹⁴

Recruitment team diversity

Diversify recruitment teams, and be mindful of the “minority tax,”⁸⁰ i.e. the disproportionate utilization of URiM faculty without compensation to “represent” the institution in recruitment, mentorship, administrative, and other DEI-related positions in order to promote the appearance of a diverse institution. A diverse recruitment team can recruit a diverse workforce and is an accepted best practice for prioritizing diversity.^{95–97} However, URiM faculty career advancement can be hindered by expectations that they serve as diversity representatives in disproportion to non-URiM faculty. This disproportionate administrative burden on URiM, individuals though often well intentioned by leadership, comes at the cost of opportunities that lead to true career development and advancement activities.²³ Time spent serving the DEI mission of the department, through recruitment or other avenues, should be appropriately recognized and built into a time-based or financial compensation structure.^{80,98,99}

Data responsive environment

Promoting a data-responsive environment requires that leadership identify, collect, evaluate, and respond to quantitative and qualitative data regarding the recruitment and selection processes, as well as the overall DEI environment at the program, department, or institution. For example, the influence of bias may be suggested by comparing the proportions of URiM to non-URiM individuals at each stage of the process: applicants, interview invitees, interviewees, new hires, promotions, and appointments to leadership roles. Metrics specific to graduate medical education recruitment may include the proportions of URiM to non-URiM individuals ranked to match, matched, advancing yearly, passing examinations, completing training, and ultimately achieving board certification if practicing. If there is a decrease in the proportion of URiM individuals from one stage to the next, systemic factors are likely contributory and should be explored in depth. This may include a more in-depth evaluation of, for example, how specific interviewers are rating

individuals from different backgrounds, whether subtly biased language may be marked on URiM evaluations, and what events or metrics are cited in individual cases of promotion or advancement denial or delay.^{92,100,101} Collect qualitative data by engaging with individuals regarding the outcomes: find out why individuals chose to join the institution, but make equal effort to find out why others chose not to accept an interview invitation, chose not to rank to match, or chose not to accept a professional or academic position.

Retention/thriving climate

In addition to the recruitment-specific approaches, some needs must be addressed at a departmental or institutional level to promote the necessary characteristics of a thriving environment. As mentioned previously, “retention” goes beyond simply retaining individuals to stay in this field or at a particular institution, and requires ensuring their development, fulfillment, advancement, and thriving.

Recommendations for promoting a diverse, equitable, and inclusive environment include explicit and compensated DEI leadership roles, committees, and departmental missions; high-quality anti-bias training; robust mentorship and sponsorship; directed, deliberate support; and fostering a data-responsive environment and safe culture.

DEI leadership roles and committees

Create leadership positions and DEI councils. Some institutions, such as the Mount Sinai School of Medicine, have reported success after a dedicated council was created to oversee early pipelines, outreach, and recruitment of URiM physicians, with representatives institution-wide.¹⁰² While a study in 2022 found that many anesthesiology departments had diversity and inclusion initiatives, only a few reported clearly defined leadership roles, which may hinder departmental success in promoting diversity.¹⁰³ DEI leadership roles and activities should be compensated in a time-based or financial structure in order to recognize the value they provide to the institution, and ensure available time for the success of the efforts.

DEI mission

Define a departmental DEI mission that clearly prioritizes diversity, equity, and inclusion in patient care, research, education, innovation, and any other divisions of the department. While it is crucial to prioritize DEI in professional development as detailed here, there must be a parallel commitment to demonstrating this as a priority in these other domains for a comprehensively safe and positive environment. For example, perceiving an increased minority tax,⁹⁹ witnessing microaggressions against patients of certain demographics,¹⁰⁴ or noticing that health equity research is less valued in a department¹⁰⁵ may undermine the morale of URiM faculty.

Anti-bias training and health equity education

Anti-bias training for all faculty and administrative leadership roles is imperative for creating an inclusive culture. As stated previously, this training must go beyond the ubiquitous and rote modules that accommodate learner multi-tasking.⁹⁴ Intensive anti-bias training should be interactive and practically tailored to the audience. Anti-bias culture emanates from the examples set by

leadership. Institutions benefit when key leaders are willing to interrogate their own biases and acknowledge the pervasive nature of bias and inequities even among progressive, well-intentioned individuals and institutions.¹⁰⁶

In addition, developing a robust health equity education program may play a valuable role in increasing workforce diversity and promoting an inclusive culture – by serving as a recruitment tool, by elevating candidates from underrepresented backgrounds, and by broadcasting an institutional commitment to health equity.^{94,107,108} In our institution, several initiatives have been started, including sponsored electives in anesthesiology and health equity for visiting students, a health equity in anesthesiology and critical care curriculum for medical students, a longitudinal case-based health equity curriculum for anesthesiology residents, and a health equity seminar series for critical care fellows.

Mentorship and sponsorship

Mentorship and sponsorship are paramount. Early and direct access to invested mentors can elevate individuals in their careers and help achieve a more representative number of URiM anesthesiologists, particularly in leadership positions.^{109–113} Pairing junior URiM team members with qualified mentors and sponsors can facilitate incoming anesthesiologists to build a foundation to succeed in their careers, through informal advice or direct linkage to grants, appointments, networking, and other career development opportunities. There is still a deficit at many institutions of available URiM mentors for URiM mentees, and there will likely continue to be a deficit until workforce equity is achieved. While many individuals may prefer a demographic-concordant mentor, this may not be a realistic possibility at most institutions. In many cases, it may better serve mentees to be paired with qualified mentors, even without demographic concordance.

Promotion support

Support URiM faculty in seeking promotion or tenure. Women and other URiM groups remain underrepresented in leadership and senior academic ranks in academic anesthesiology, notably in full professor, department chair, and journal editor roles.^{31,34,70} Biases may sometimes influence the promotion and tenure process unduly. Individuals who have systematically experienced bias throughout their earlier careers may be passed over for promotion, or be less likely to be nominated for leadership positions or awards due to not belonging to the same demographic or social circles as those in positions of power. Recognize the value of URiM team members and ensure that the work of all colleagues is recognized appropriately within the department and institution.

Dedicated support for tangible and intangible needs

Foster community-building within URiM groups by providing time and financial support for these wellness and connection activities. Fostering a culture of connection can promote collaborative innovation, reduce social isolation, and increase resilience.

Create and publicize resources for wellness and resilience support, mental health support, dependent care, financial assistance, and mistreatment reporting. One example is providing funding support and debt reduction programs for URiM fellows.

A University of Michigan initiative allocating 1% of its budget annually for these initiatives has had remarkable impact. URiM matriculation rates doubled, and faculty promotion and tenure increased significantly. Institution-wide debt reduction programs and targeted recruitment packages can close salary inequities and reduce attrition rates for women and URiM faculty.¹¹⁴

Data-responsive environment

As recommended for the recruitment process, regularly evaluating program and departmental trends may provide opportunities to address concerns and mitigate bias and inequity. Quantitative data may include cross-referencing demographics with salaries, evaluations, rank/position levels, time to promotion, attritions/departures, and other more granular features of academic and/or clinical productivity. Care must be taken when evaluating these data, in order to look at any gaps or issues as opportunities for improvement in program or departmental support, rather than further discrimination and judgment. Compensation gaps by gender are well-documented and must continue to be moved toward equity.^{34,115,116} Qualitative data should be collected with invested effort, given the prevalence of survey burnout, disillusionment on the potential for change, and fear of non-anonymity and potential retaliation. In healthcare where hierarchy is prominent, individuals may feel compelled to remain silent about upsetting behavior from senior team members, e.g., attending physicians or administrative leaders, because speaking out can affect their professional career.¹¹⁷ Validated tools like the Maslach Burnout Inventory with Areas of Work Life can be used, along with free-text feedback forms, to solicit input from individuals on actionable domains of concern in workplace wellness and satisfaction.¹¹⁸ Solicit feedback from URiM individuals at the institution to learn about invisible barriers and challenges that may be present within the institutional culture. A study by the Johns Hopkins University School of Medicine found that URiM faculty were less likely to believe that faculty recruitment was unbiased, that networking included minorities, and that they would be at their current institution in five years.¹¹⁹ Regarding resident attrition, although life events and changes of heart can occur, the premature departure of any URiM trainee should be considered a serious event and explored for opportunities to address and improve.¹²⁰ By prioritizing a data-responsive environment, leadership can demonstrate to URiM team members that their presence is valued, their concerns are valid, and leadership is willing to make necessary modifications to improve the institutional environment and promote success.

While the status of URiM representation in academic anesthesiology has progressed in some ways compared with two decades ago, some metrics have seen little to no change (e.g., the distribution of competitive grants, grand rounds speaking invitations, and faculty appointments and promotions).^{34,116,121,122} It has been projected that diversity efforts will take at least three decades to reach professional racial equity comparable to the U.S. population distribution.²⁸ To achieve these targets, individuals at every level in the department or institution must recognize the importance of expanding the candidate pool and closing hiring gaps. Within academic institutions, URiM anesthesiologists can benefit from active and vocal support at various stages of their careers. Successful faculty recruitment, retention, and career advancement require longitudinal support at the interview, work culture, and workplace policy levels. By following these strategies

for increasing access to mentors, resources, research, and opportunities, URiM faculty can experience increased belonging and break through barriers and biases.

Pathway programs

In a resource-rich environment, DEI leaders may collaborate to launch new programs dedicated to improving pathways for URiM individuals to pursue careers in anesthesiology. Pathway programs, formerly referred to as pipeline programs, are specialized initiatives designed to encourage and facilitate students from underrepresented backgrounds to pursue science, technology, engineering, and mathematics (STEM); healthcare and medicine; and other unique fields.¹²³ In healthcare, pathway programs engaging students in high school, college, and postbaccalaureate programs have shown positive outcomes for URiM students in several key metrics, including academic performance and acceptance into health professions medical schools.¹²⁴ Despite these successes, the pathway progression becomes “leaky” at each subsequent stage of advancement, as detailed previously. URiM representation seen at more junior levels wanes at more senior levels. In order to promote and ensure diversity at all levels of academia, a similar approach to pathway programs may be needed at each advancing educational level. Although resource-intensive, these programs have demonstrated sustained impact at other educational levels and have the potential to elevate URiM success at the institutional level and at a broader national or global level. At our institution, we launched the Pathways in Medicine: Discovery Lab (“PMDL”) in partnership with the Office of Diversity, Inclusion, and Health Equity (ODIHE). PMDL is a purpose-built program to recruit and empower URiM medical students to pursue academic residency programs. Each component of the program is designed to address evidence-supported factors in URiM academic success and career progression. Although there are many possible designs for a pathway program, we share this descriptive experience as a potential model for other institutions to implement or modify.

1. Logistics: The program is free of charge, virtual (to eliminate hidden costs of participation and minimize other barriers), scheduled on weekends at times optimized for U.S. time zones, and slated to occur three times per year on dates selected strategically to minimize major medical student conflicts (e.g., conferences, deadlines) and to correspond with key phases of the medical student trajectory. The longitudinal nature allows students to continue with the pathway program throughout their own advancement in medical training and continue to find content relevant to their acute needs. The low barrier to entry (i.e., absence of required application and fee) reduces structural barriers and implicit bias.
2. Specialty Roundtable and Focused Guidance: These sessions introduce URiM students to the breadth of specialties available to pursue in residency training. URiM individuals are disproportionately underrepresented in more competitive specialties.^{125–127} This may be due to multiple factors, including differential exposure, differential access to mentorship on application enhancement, and implicit and structural bias in the application process.^{37,109} While the last factor is less modifiable via a pathway program, the program addresses the other two factors in its design. Over the three sessions of each year, the program introduces all of the

ACGME specialties, describes specialty-specific strategies for optimizing candidacy, and connects pathway participants with potential mentors in these specialties.

3. Workshops: Workshops are interactive skills- and knowledge-focused sessions to build participants’ strengths in developing and navigating their academic medical careers. Each program day includes breakout sessions targeted for each year of medical school, such as time management in medical school for first- and second-years and away rotation tips for advanced-year students. The topics are rotated throughout the year to optimize relevance for each medical student stage (e.g., personal statement writing in the spring and interview tips in the fall). The overall roster includes universally relevant topics as well as targeted areas identified by URiMs in research on barriers to academic advancement.³⁷ To further curate the content, program registrants are surveyed in advance of the program day to solicit any particular topics of interest. All feedback is disseminated to program speakers for their discretion in inclusion; for topics requested by numerous participants, a targeted session may be added specifically on this area. A selected list of workshops conducted on regular rotation includes studying for exams, mentorship, networking, time management, wellness, imposter syndrome, choosing rotations, choosing a specialty, discrimination/microaggressions on the wards, personal statements, interview skills, research, navigating an unsuccessful match, and planning for fellowship or future next steps.
4. Networking: In addition to the informal networking facilitated by the specialty and workshop sessions, the final segment of each program day is dedicated to direct networking opportunities through the event platform, which facilitates random-matched or interest-matched networking between potential mentors and mentees or between peers.¹¹¹
5. Speakers: Speaker selection carefully balances targeted invitations for valued experts with open-call invitations for emerging leaders. Diversity of the speaker panel is prioritized, while being mindful of the “minority tax.”⁸⁰ Pathway program leaders advocate for speaker involvement to be recognized and compensated on a time-based academic model by the home department.
6. Institutional Support: An instrumental feature of the success of this program is the high-level institutional support and direct administrative support from the Office of Diversity, Inclusion, and Health Equity (ODIHE), the Office of Graduate Medical Education, and the School of Medicine. ODIHE program coordinators assist with organizing, scheduling, marketing, technology infrastructure, and event facilitation and moderation.

Conclusion

Structural and implicit bias creates healthcare workforce inequity and can significantly impact patients’ health outcomes and clinician success and wellness. Advancing workforce equity in anesthesiology must be a priority for healthcare leaders, program directors, policymakers, and individual anesthesiologists. Attention and resources must be directed towards DEI efforts that ensure more equitable access for URiM individuals to pursue

anesthesiology training, thrive in their careers, and progress into leadership positions.

Participating in and facilitating these dialogues on race, gender, and other heavy topics can be challenging, but these conversations are critical for undoing bias and its consequences. While many of the recommended interventions may be resource-intensive, countless opportunities are available at every level to “move the needle” and make a positive impact on progress toward workforce equity. We hope our recommendations can serve as a resource for anesthesiology leaders to enhance DEI efforts at their programs and institutions and to enhance URIM representation and success in the field of anesthesiology. On an individual level, this means acknowledging privilege and taking bold steps to foster a more inclusive work environment. For anesthesiology training programs and departments, advancing healthcare workforce equity requires comprehensively monitoring DEI data and addressing gaps, such as bias in recruitment and advancement, workforce education, and dedicated support for tangible and intangible needs. Pathway programs are a high-value approach to elevate healthcare workforce equity in a comprehensive, learner-centered manner. Making an impact at the global level may require robust international and interdisciplinary collaboration and expansion of the existing educational models.

Leaders today have an increased capacity to promote healthy discussions about race, ethnicity, gender, orientation, ability status, socioeconomic background, and other intersectional factors. They also have a professional and social responsibility to address systemic inequities and confront legacies of bias in anesthesiology and medicine overall. When we fully recognize the importance of fostering diversity and equity in healthcare, we move closer to a brighter, healthier future for our peers, our patients, and ourselves.

Conflict of interest disclosure

All authors declare that they have no conflicts of interest.

Acknowledgments

Thank you to Dyesheena Brown AA, Shellon Johnson MBA, and the Office of Diversity, Inclusion, and Health Equity, Johns Hopkins Medicine. Thank you to the Diversity, Equity, and Inclusion Council of the Department of Anesthesiology and Critical Care Medicine, Johns Hopkins University School of Medicine.

References

1. Penman-Aguilar A, Talih M, Huang D, *et al.* Measurement of health disparities, health inequities, and social determinants of health to support the advancement of health equity. *J Public Health Manag Pract.* 2016;22(Suppl 1):S33–S42.
2. Beckfield J, Olafsdottir S. Health inequalities in global context. *Am Behav Sci.* 2013;57:1014–1039.
3. Lett E, Dowshen NL, Baker KE. Intersectionality and health inequities for gender minority Blacks in the US. *Am J Prev Med.* 2020;59:639–647.
4. Adler NE, Stewart J. Preface to the biology of disadvantage: socioeconomic status and health. *Ann N Y Acad Sci.* 2010;1186:1–4.
5. Krahn GL, Walker DK, Correa-De-Araujo R. Persons with disabilities as an unrecognized health disparity population. *Am J Public Health.* 2015;105(Suppl 2):S198–S206.
6. Ponce NA, Hays RD, Cunningham WE. Linguistic disparities in health care access and health status among older adults. *J Gen Intern Med.* 2006;21:786–791.
7. Braveman P. Health disparities and health equity: concepts and measurement. *Annu Rev Public Health.* 2006;27:167–194.
8. Memtsoudis SG, Besculides MC, Swamidoss CP. Do race, gender, and source of payment impact on anesthetic technique for inguinal hernia repair? *J Clin Anesth.* 2006;18:328–333.
9. Burwick AJ, Blumenfeld YJ, Brookfield KF, *et al.* Racial and ethnic disparities in mode of anesthesia for cesarean delivery. *Anesth Analg.* 2016;122:472–479.
10. Andreae MH, Gabry JS, Goodrich B, *et al.* Antiemetic prophylaxis as a marker of health care disparities in the National Anesthesia Clinical Outcomes Registry. *Anesth Analg.* 2018;126:588–599.
11. Tangel VE, Matthews KC, Abramovitz SE, *et al.* Racial and ethnic disparities in severe maternal morbidity and anesthetic techniques for obstetric deliveries: a multi-state analysis, 2007–2014. *J Clin Anesth.* 2020;65:109821.
12. Nardone A, Casey JA, Morello-Frosch R, *et al.* Associations between historical residential redlining and current age-adjusted rates of emergency department visits due to asthma across eight cities in California: an ecological study. *Lancet Planet Health.* 2020;4:e24–e31.
13. Whittle J, Conigliaro J, Good CB, *et al.* Racial differences in the use of invasive cardiovascular procedures in the Department of Veterans Affairs Medical System. *N Engl J Med.* 1993;329:621–627.
14. Hoffman KM, Trawalter S, Axt JR, *et al.* Racial bias in pain assessment and treatment recommendations, and false beliefs about biological differences between blacks and whites. *Proc Natl Acad Sci U S A.* 2016;113:4296–4301.
15. Sadhasivam S, Chidambaran V, Ngamprasertwong P, *et al.* Race and unequal burden of perioperative pain and opioid related adverse effects in children. *Pediatrics.* 2012;129:832–838.
16. Sjöding MW, Dickson RP, Iwashyna TJ, *et al.* Racial bias in pulse oximetry measurement. *N Engl J Med.* 2020;383:2477–2478.
17. Zelnick LR, Leca N, Young B, *et al.* Association of the estimated glomerular filtration rate with vs without a coefficient for race with time to eligibility for kidney transplant. *JAMA Netw Open.* 2021;4:e2034004.
18. Gijssberts CM, Groenewegen KA, Hoefler IE, *et al.* Race/ethnic differences in the associations of the Framingham risk factors with carotid IMT and cardiovascular events. *PLoS One.* 2015;10:e0132321.
19. Braun L. Race, ethnicity and lung function: A brief history. *Can J Respir Ther.* 2015;51:99–101.
20. Bhavani SV, Wiley Z, Verhoef PA, *et al.* Racial differences in detection of fever using temporal vs oral temperature measurements in hospitalized patients. *JAMA.* 2022;328:885–886.
21. Dreyer RP, Beltrame JF, Tavella R, *et al.* Evaluation of gender differences in Door-to-Balloon time in ST-elevation myocardial infarction. *Heart Lung Circ.* 2013;22:861–869.
22. Ali I, Vattigunta S, Jang JM, *et al.* Racial disparities are present in the timing of radiographic assessment and surgical treatment of hip fractures. *Clin Orthop Relat Res.* 2020;478:455–461.
23. Bönte M, von dem Knesebeck O, Siegrist J, *et al.* Women and men with coronary heart disease in three countries: are they treated differently? *Womens Health Issues.* 2008;18:191–198.
24. Lutfey KE, Link CL, Grant RW, *et al.* Is certainty more important than diagnosis for understanding race and gender disparities?: An experiment using coronary heart disease and depression case vignettes. *Health Policy.* 2009;89:279–287.
25. Cooper LA, Roter DL, Carson KA, *et al.* The associations of clinicians' implicit attitudes about race with medical visit communication and patient ratings of interpersonal care. *Am J Public Health.* 2012;102:979–987.
26. Stepanikova I. Racial-ethnic biases, time pressure, and medical decisions. *Health Soc Behav.* 2012;53:329–343.
27. Sabin JA, Greenwald AG. The influence of implicit bias on treatment recommendations for four common pediatric conditions: pain, urinary tract infection, attention deficit hyperactivity disorder, and asthma. *Am J Public Health.* 2012;102:988–995.
28. Bennett CL, Yiadom MYAB, Baker O, *et al.* Examining parity among Black and Hispanic resident physicians. *J Gen Intern Med.* 2021;36:1722–1725.
29. Rodríguez JE, Campbell KM, Fogarty JP, *et al.* Underrepresented minority faculty in academic medicine: a systematic review of URM faculty development. *Fam Med.* 2014;46:100–104.

30. Kierali IM, Nivet MA. The racial and ethnic composition and distribution of primary care physicians. *J Health Care Poor Underserved*. 2018;29:556–570.
31. Toledo P, Duce L, Adams J, et al. Diversity in the American Society of Anesthesiologists leadership. *Anesth Analg*. 2017;124:1611–6.
32. McCullough D, Gotian R. Making anaesthesiology more inclusive: the time for action is now. *Br J Anaesth*. 2020;125:e458–e460.
33. Chiem J, Libaw J, Ehie O. Diversity of anesthesia workforce - why does it matter? *Curr Opin Anaesthesiol*. 2018;32:208–214.
34. Bissing MA, Lange EMS, Davila WF, et al. Status of women in academic anesthesiology: a 10-year update. *Anesth Analg*. 2019;128:137–143.
35. Odonkor CA, Leitner B, Taraben S, et al. Diversity of pain medicine trainees and faculty in the United States: a cross-sectional analysis of fellowship training from 2009–2019. *Pain Med*. 2021;22:819–828.
36. Doshi TL, Richter HC, Salisu M, et al. Representation of women in pain medicine fellowships in the United States, 2017–2018. *Pain Med*. 2019;21:e62–e67.
37. Osseo-Asare A, Balasuriya L, Huot SJ, et al. Minority resident physicians' views on the role of race/ethnicity in their training experiences in the workplace. *JAMA Netw Open*. 2018;1:e182723.
38. Abraham F. Medical Education in the United States and Canada. New York: Carnegie Foundation; 1910:p. 364. http://archive.carnegiefoundation.org/publications/pdfs/elibrary/Carnegie_Flexner_Report.pdf.
39. Savitt T. Flexner and the black medical schools (1992). *J Natl Med Assoc*. 2006;98:1415–1424.
40. Shea S, Fullilove MT. Entry of Black and other minority students into US medical schools: historical perspective and recent trends. *N Engl J Med*. 1985;313:933–940.
41. Jones W Jr, Rice MF. Health care, public policy and the courts: black health status as a civil rights issue. *Health Policy*. 1985;5:207–221.
42. Foma E. Impact of workplace diversity. *Rev Integr Bus Econ Res*. 2014;3:382–410.
43. Bowen WG, Bok DC *The Shape of the River: Long-Term Consequences of Considering Race in College and University Admissions*. 2. print., 1. paperback print. Princeton University Press; 2000.
44. Clayborne EP, Martin DR, Goett RR, et al. Diversity pipelines: the rationale to recruit and support minority physicians. *J Am Coll Emerg Physicians Open*. 2021;2:e12343.
45. Cohen JJ. Time to shatter the glass ceiling for minority faculty. *JAMA*. 1998;280:821.
46. Lasser KE, Mintzer IL, Lambert A, et al. Missed appointment rates in primary care: the importance of site of care. *J Health Care Poor Underserved*. 2005;16:475–486.
47. McKinlay JB, Lin T, Freund K, et al. The unexpected influence of physician attributes on clinical decisions: results of an experiment. *J Health Soc Behav*. 2002;43:92–106.
48. Clark T, Sleath B, Rubin RH. Influence of ethnicity and language concordance on physician–patient agreement about recommended changes in patient health behavior. *Patient Educ Couns*. 2004;53:87–93.
49. Smith SG, Nsiah-Kumi PA, Jones PR, et al. Pipeline programs in the health professions, part 1: preserving diversity and reducing health disparities. *J Natl Med Assoc*. 2009;101:836–851.
50. Jackson CS, Gracia JN. Addressing health and health-care disparities: the role of a diverse workforce and the social determinants of health. *Public Health Rep*. 2014;129(1_suppl2):57–61.
51. Saha S, Shipman SA. Race-neutral versus race-conscious workforce policy to improve access to care. *Health Affairs*. 2008;27:234–245.
52. Hinton I, Howell J, Merwin E, et al. The educational pipeline for health care professionals: understanding the source of racial differences. *J Hum Resour*. 2008;45:43.
53. Saha S. Student body racial and ethnic composition and diversity-related outcomes in US medical schools. *JAMA*. 2008;300:1135.
54. Wilbur K, Snyder C, Essary AC, et al. Developing workforce diversity in the health professions: a social justice perspective. *Health Prof Educ*. 2020;6:222–229.
55. Marrast LM, Zallman L, Woolhandler S, et al. Minority physicians' role in the care of underserved patients: diversifying the physician workforce may be key in addressing health disparities. *JAMA Intern Med*. 2014;174:289.
56. Traylor AH, Schmittiel JA, Uratsu CS, et al. Adherence to cardiovascular disease medications: does patient-provider race/ethnicity and language concordance matter? *J Gen Intern Med*. 2010;25:1172–1177.
57. Wallis CJD, Jerath A, Coburn N, et al. Association of surgeon-patient sex concordance with postoperative outcomes. *JAMA Surg*. 2022;157:146–156.
58. Bradford J, Reisner SL, Honnold JA, et al. Experiences of transgender-related discrimination and implications for health: Results from the Virginia transgender health initiative study. *Am J Public Health*. 2013;103:1820–1829.
59. Bauer GR, Hammond R, Travers R, et al. I don't think this is theoretical'; this is our lives: How erasure impacts health care for transgender people. *J Assoc Nurses AIDS Care*. 2009;20:348–361.
60. Hafeez H, Zeshan M, Tahir MA, et al. Health care disparities among lesbian, gay, bisexual, and transgender youth: a literature review. *Cureus*. 2017;9:e1184.
61. Baptiste-Roberts K, Oranuba E, Werts N, et al. Addressing health care disparities among sexual minorities. *Obstet Gynecol Clin North Am*. 2017;44:71–80.
62. Acosta DA, Poll-Hunter NI, Eliason J. Trends in racial and ethnic minority applicants and matriculants to US medical schools, 1980–2016. Analysis in Brief. *J Assoc Am Med Coll*. 2017;17:1–4.
63. Talamantes E, Henderson MC, Fancher TL, et al. Closing the gap - making medical school admissions more equitable. *N Engl J Med*. 2019;380:803–805.
64. Snyder CR, Frogner BK, Skillman SM. Facilitating racial and ethnic diversity in the health workforce. *J Allied Health*. 2018;47:58–65.
65. Association of American Medical Colleges. Number of active MD residents, by race/ethnicity (alone or in combination) and GME specialty. Available at: <https://www.aamc.org/data-reports/students-residents/inter-active-data/report-residents/2020/table-b5-md-residents-race-ethnicity-and-specialty>. Accessed August 15, 2022.
66. Sitkin NA, Pachankis JE. Specialty choice among sexual and gender minorities in medicine: the role of specialty prestige, perceived inclusion, and medical school climate. *LGBT Health*. 2016;3:451–460.
67. Association of American Medical Colleges. FACTS. 2021 FACTS: Applicants and Matriculants Data. Available at: <https://www.aamc.org/data-reports/students-residents/interactive-data/2021-facts-applicants-and-matriculants-data>. Accessed October 11, 2022.
68. Accreditation Council on Graduate Medical Education. Data Resource Book 2020–2021. Available at: https://www.acgme.org/globalassets/pfassets/publicationsbooks/2020-2021_acgme_databook_document.pdf. Accessed August 15, 2022.
69. Li B, Jacob-Brassard J, Dossa F, et al. Gender differences in faculty rank among academic physicians: a systematic review and meta-analysis. *BMJ Open*. 2021;11:e050322.
70. Daniels AH, Flexman AM, Lorello GR. Intersection of gender, race, and academic rank in anesthesiology. *Can J Anaesth*. 2021;68:272–273.
71. Association of American Medical Colleges. US Medical School Faculty Report. Available at: <https://www.aamc.org/data-reports/faculty-institutions/faculty-roster>. Accessed August 15, 2022.
72. Edmond MB, Deschenes JL, Eckler M, et al. Racial bias in using USMLE step 1 scores to grant internal medicine residency interviews. *Acad Med*. 2001;76:1253–1256.
73. Bateman LB, Heider L, Vickers SM, et al. Barriers to advancement in academic medicine: the perception gap between majority men and other faculty. *J Gen Intern Med*. 2021;36:1937–1943.
74. Sánchez JP, Poll-Hunter NI, Stern N, et al. Balancing two cultures: American Indian/Alaska Native medical students' perceptions of academic medicine careers. *J Community Health*. 2016;41:871–880.
75. Sudol NT, Guaderrama NM, Honsberger P, et al. Prevalence and nature of sexist and racial/ethnic microaggressions against surgeons and anesthesiologists. *JAMA Surg*. 2021;156:e210265.
76. Goulart MF, Huayllani MT, Balch Samora J, et al. Assessing the prevalence of microaggressions in plastic surgery training: a national survey. *Plast Reconstr Surg Glob Open*. 2021;9:e4062.
77. Alimi Y, Bevilacqua LA, Snyder RA, et al. Microaggressions and implicit bias in surgical training: an undocumented but pervasive phenomenon. *Ann Surg*. 2021. doi:10.1097/SLA.0000000000004917 [Epub ahead of print].
78. Yehia BR, Cronholm PF, Wilson N, et al. Mentorship and pursuit of academic medicine careers: a mixed methods study of residents from diverse backgrounds. *BMC Med Educ*. 2014;14:26.
79. Oh L, Linden JA, Zeidan A, et al. Overcoming barriers to promotion for women and underrepresented in medicine faculty in academic emergency medicine. *J Am Coll Emerg Physicians*. 2021;2:e12552.
80. Rodríguez JE, Campbell KM, Pololi LH. Addressing disparities in academic medicine: what of the minority tax? *BMC Med Educ*. 2015;15:6.
81. Krishnan N, Szczepura A. Beyond the glass ceiling-do women in senior positions face a precarious glass cliff? *JAMA Surg*. 2021;156:589.

82. Sebastian C. A diagnosis of discrimination. *Women physicians and the glass ceiling*. *Med Group Manage J*.1994;41:32–38.
83. Dosssett LA, Mulholland MW, Newman EA, and Michigan Promise Working Group for Faculty Life Research. Building high-performing teams in academic surgery: the opportunities and challenges of inclusive recruitment strategies. *Acad Med*. 2019;94:1142–1145.
84. Vassie C, Smith S, Leedham-Green K. Factors impacting on retention, success and equitable participation in clinical academic careers: a scoping review and meta-thematic synthesis. *BMJ Open*. 2020;10:e033480.
85. Sgoutas-Emch S, Baird L, Myers P, et al. We're not all white men: using a cohort/cluster approach to diversify STEM faculty hiring. *Thought Action*. 2006;32:91–107.
86. Low D, Pollack SW, Liao ZC, et al. Racial/ethnic disparities in clinical grading in medical school. *Teach Learn Med*. 2019;31:487–496.
87. Santen SA, Davis KR, Brady DW, et al. Potentially discriminatory questions during residency interviews: frequency and effects on residents' ranking of programs in the national resident matching program. *J Grad Med Educ*. 2010;2:336–340.
88. Dream S, Olivet MM, Tanner L, et al. Do male chairs of surgery have implicit gender bias in the residency application process? *Am J Surg*. 2021;221:697–700.
89. Helm DM, Grabarek ES, Reveal M. Increasing dental hygiene student diversity: life-performance questions as alternative admissions criteria. *J Allied Health*. 2003;32:279–284.
90. Pope AJ, Carter K, Ahn J. A renewed call for a more equitable and holistic review of residency applications in the era of COVID-19. *AEM Educ Train*. 2020;5:135–138.
91. Haag J, Sanders BE, Walker Keach J, et al. Impact of blinding interviewers to written applications on ranking of Gynecologic Oncology fellowship applicants from groups underrepresented in medicine. *Gynecol Oncol Rep*. 2022;39:100935.
92. Kang SK, DeCelles KA, Tilcsik A, et al. Whiteness résumés: race and self-presentation in the labor market. *Adm Sci Q*. 2016;61:469–502.
93. Implicit Association Test (IAT). Project Implicit. Available at: <https://implicit.harvard.edu/implicit>. Accessed August 15, 2022.
94. Ogunyemi D. Defeating unconscious bias: The role of a structured, reflective, and interactive workshop. *J Grad Med Educ*. 2021;13:189–194.
95. Williams JB. Accountability as a debiasing strategy: Testing the effect of racial diversity in employment committees. *Iowa L Rev*. 2017;103:1593.
96. Sensoy Ö, DiAngelo R. "We are all for diversity, but ...": How faculty hiring committees reproduce whiteness and practical suggestions for how they can change. *Harv Educ Rev*. 2017;87:557–580.
97. Bombaci SP, Pejchar L. Advancing equity in faculty hiring with diversity statements. *BioScience*. 2022;72:365–371.
98. Hoff ML, Liao NN, Mosquera CA, et al. An initiative to increase residency program diversity. *Pediatrics*. 2022;149:e2021050964.
99. Adebayo NA, Madorsky TZ, Alhalel J, et al. Underrepresented Minority (URM) physician exploitation exacerbated by the COVID-19 pandemic: implications to URM physician-faculty burnout and worsening health disparities. *Harv Public Health Rev (Camb)*. 2021;30:1–5.
100. Rivera LA. Hiring as cultural matching: the case of elite professional service firms. *Am Sociol Rev*. 2012;77:999–1022.
101. Goddu AP, O'Connor KJ, Lanzkron S, et al. Do words matter? Stigmatizing language and the transmission of bias in the medical record. *J Gen Intern Med*. 2018;33:685–691.
102. Butts GC, Hurd Y, Palermo A-GS, et al. Role of institutional climate in fostering diversity in biomedical research workforce: a case study. *Mt Sinai J Med*. 2012;79:498–511.
103. Brooks AK, Liang Y, Brooks M, et al. Leadership roles and initiatives for diversity and inclusion in academic anesthesiology departments. *J Natl Med Assoc*. 2022;114:147–155.
104. Konuthula D, de Abril Cameron F, Jonassaint N, et al. Perspectives on anti-Black racism and mitigation strategies among faculty experts at academic medical centers. *JAMA Netw Open*. 2022;5:e228534.
105. Pololi L, Cooper LA, Carr P. Race, disadvantage and faculty experiences in academic medicine. *J Gen Intern Med*. 2010;25:1363–1369.
106. Hall WJ, Chapman MV, Lee KM, et al. Implicit racial/ethnic bias among health care professionals and its influence on health care outcomes: a systematic review. *Am J Public Health*. 2015;105:e60–e76.
107. Bouye KE, McCleary KJ, Williams KB. Increasing diversity in the health professions: reflections on student pipeline programs. *J Healthc Sci Humanit*. 2016;6:67–79.
108. Burks CA, Russell TI, Goss D, et al. Strategies to increase racial and ethnic diversity in the surgical workforce: a state of the art review. *Otolaryngol Head Neck Surg*. 2022;166:1182–1191.
109. Mahendran GN, Walker ER, Bennett M, et al. Qualitative study of mentorship for women and minorities in surgery. *J Am Coll Surg*. 2022;234:253–261.
110. Nafu OO, Haydar B. Mentoring programs in academic anesthesiology: a case for PROFOUND mentoring for underrepresented minority faculty. *Anesth Analg*. 2019;129:316–320.
111. Bonifacino E, Ufomata EO, Farkas AH, et al. Mentorship of underrepresented physicians and trainees in academic medicine: a systematic review. *J Gen Intern Med*. 2021;36:1023–1034.
112. Beech BM, Calles-Escandon J, Hairston KG, et al. Mentoring programs for underrepresented minority faculty in academic medical centers: a systematic review of the literature. *Acad Med*. 2013;88:541–549.
113. Subramanian JB, Ravikumar U. Leadership in anaesthesiology through mentoring. *Indian J Anaesth*. 2018;62:1–3.
114. Davenport D, Alvarez A, Natesan S, et al. Faculty recruitment, retention, and representation in leadership: an evidence-based guide to best practices for diversity, equity, and inclusion from the Council of Residency Directors in Emergency Medicine. *West J Emerg Med*. 2022;23:62–71.
115. Hertzberg LB, Miller TR, Byerly S, et al. Gender differences in compensation in anesthesiology in the United States: results of a national survey of anesthesiologists. *Anesth Analg*. 2021;133:1009–1018.
116. Bosco L, Lorello GR, Flexman AM, et al. Women in anaesthesia: a scoping review. *Br J Anaesth*. 2020;124:e134–e147.
117. Kearns E, Khurshid Z, Anjara S, et al. Power dynamics in healthcare teams – a barrier to team effectiveness and patient safety: a systematic review. *BJS Open*. 2021;5(Suppl 1):zrab032.091.
118. Downey RL, Farhat T, Schumann R. Burnout and coping amongst anesthesiologists in a US metropolitan area: a pilot study. *Middle East J Anaesthesiol*. 2012;21:529–534.
119. Price EG, Powe NR, Kern DE, et al. Improving the diversity climate in academic medicine: faculty perceptions as a catalyst for institutional change. *Acad Med*. 2009;84:95–105.
120. Keshinro A, Frangos S, Berman RS, et al. Underrepresented minorities in surgical residencies: where are they? a call to action to increase the pipeline. *Ann Surg*. 2020;272:512–520.
121. Wong CA, Stock MC. The status of women in academic anesthesiology: a progress report. *Anesth Analg*. 2008;107:178–184.
122. Kraus MB, Gali B, Cunningham GW. Speaker gender representation for anesthesiology grand rounds at a large academic medical center. *J Educ Perioper Med*. 2020;22:E654.
123. Fealing KH, Lai Y, Myers SL. Pathways vs. pipelines to broadening participation in the STEM workforce. *J Women Minor Scien Eng*. 2015;21:271–293.
124. U.S. Department of Health and Human Services, Health Resources and Services Administration, Bureau of Health Professions and U.S. Department of Health and Human Services, Office of Public Health and Science, Office of Minority Health. Pipeline Programs to Improve Racial and Ethnic Diversity in the Health Professions: An Inventory of Federal Programs, Assessment of Evaluation Approaches, and Critical Review of the Research Literature. Published online April 2009. Available at: <https://www.aapcho.org/wp-content/uploads/2012/11/PipelineToImproveDiversityInHealthProfessions.pdf>. Accessed August 15, 2002.
125. Nieblas-Bedolla E, Williams JR, Christophers B, et al. Trends in race/ethnicity among applicants and matriculants to US surgical specialties, 2010–2018. *JAMA Netw Open*. 2020;3:e2023509.
126. Mylavarapu P, Gupta NE, Gudi V, et al. Diversity within the most competitive internal medicine fellowships: examining trends from 2008 to 2018. *J Gen Intern Med*. 2020;35:2537–2544.
127. Akhiyat S, Cardwell L, Sokumbi O. Why dermatology is the second least diverse specialty in medicine: How did we get here? *Clin Dermatol*. 2020;38:310–315.